

Attorney's Docket No.: Intel/10559/237001 / P8886

Application No.: 09/274,797

Response dated November 4, 2003

Reply to Office Action of September 5, 2003

connection linking a source node and a destination node via the network switch", the official action cites col. 8, lines 22-35, and col. 5, lines 57-63, which teach setting of an allowable cell rate (ACR) at the source station, and selecting a virtual channel connection in a table at the source station, respectively. These cited portions refer to operations performed in the source station and not in a network switch as claimed. Moreover, these cited portions do not describe, "determining rate-based, flow-control data in a network switch, in response to receipt of a forward resource management control cell in the network switch" as claimed.

With respect to the last element of claim 37, "modifying in the network switch the backward resource management control cell, before forwarding the backward resource management control cell to the source node, based on the rate-based, flow-control data determined in response to the receipt of the forward resource management control cell", the official action cites col. 7, lines 22-26, which states: "When the station A is transmitting cells in the transmit direction to the station B, the station A changes its rate depending upon the response of the station B and the response of the switch 132 in the receive direction from the station B to the station A." This portion of Lincoln refers to the traditional Asynchronous Transfer Mode (ATM) techniques of adjusting the transmission rate based on backward resource management (BRM) cells sent by the destination station (station B) and by the one or more switches between the source station and the destination station.

The destination station transmits BRM cells to adjust the transmission rate as a matter of course, as illustrated in FIG.

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5: "When received by the station B, the forward RM cells 134 become backward RM cells 136 in the station B." (See Lincoln at col. 7, lines 8-10.) The network switch can also transmit its own backward RM cell to adjust the transmission rate: "A switch such as the switch 132 can generate its own RM cell. The switch can do this when it is congested and an RM cell has not passed through the switch for a particular period of time." (See Lincoln at col. 9, lines 22-25.) Neither of these cited portions, nor Lincoln generally, describe modifying in the network switch the received backward resource management control cell, before forwarding the backward resource management control cell to the source node, based on the rate-based, flow-control data determined in response to the receipt of the forward resource management control cell.

In traditional ATM networks, modification of a BRM cell passing the network switch is done using rate-based, flow-control data determined in response to receipt of the BRM cell itself. Nothing in Lincoln suggests that the ATM switch described is doing anything different than the traditional approach of recalculating rate-based, flow-control data, such as explicit rate (ER) data, for a backward RM cell in response to receipt of the backward RM cell at the ATM switch. This traditional approach can require a high-speed processing unit in the ATM switch to ensure that the ER calculation time does not exceed the desired cell processing and transport delay.

Lincoln teaches systems and techniques to perform traffic management algorithms more efficiently, thus potentially reducing the time needed to recalculate rate-based, flow-control data. At the end stations, these techniques mean that rate-

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based, flow-control data is calculated for an outgoing BRM cell in response to receipt of an FRM cell, but this is still the traditional approach to turning FRM cells into BRM cells at the end stations. The BRM cells being modified in Lincoln are not received BRM cells as claimed, but rather new BRM cells generated from the FRM cells received. Lincoln fails to teach or suggest the claimed event-based calculations in the switch, where the preparation of rate-based, flow-control data for the returning backward RM cell, which passes through the switch, is initiated in response to receipt of a forward RM cell passing through the switch and before receipt of the backward RM cell.

Independent claim 51 recites, "means for initiating preparation of rate-based, flow-control data in response to receipt of a forward resource management cell from the source node and before receipt of a backward resource management cell corresponding to the forward resource management control cell." The claimed event-based systems and techniques can significantly reduce the amount of required processor resources to control Available Bit Rate (ABR) based flows in ATM equipment. Lincoln fails to teach or suggest this event-based approach to calculating rate-based, flow-control data for BRM cells passing through a network switch.

Moreover, with respect to dependent claim 39, the control memory 38 cited in the official action does not store rate-based, flow-control data, which has been determined in a network switch in response to receipt of a forward resource management control cell, "before receipt of the backward resource management control cell in the network switch", as claimed.

According to Lincoln, "The control memory 38 turns the forward

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RM cell around [...] so that the forward RM cell becomes a backward RM cell which is transmitted through the line 8a to the segmentation block 152." (See Lincoln at col. 10, lines 63-67.)

Use of the control memory 38 is never discussed in Lincoln in the presently claimed context of modifying backward RM cells based on rate-based, flow-control data calculated previously in response to receipt of the corresponding forward RM cell and before receipt of the backward RM cell.

With respect to dependent claim 40, Lincoln fails to teach or suggest "receiving the forward resource management control cell in the network switch, and placing a management event record corresponding to the forward resource management control cell in a queue." The cited portion of Lincoln refer to receiving an RM cell in a source station, and the only queue mentioned in Lincoln is a Free Region Queue that includes memory region addresses and region lengths in the host memory; these new host memory regions can be used to transfer the cell payloads to the host memory 32. (See Lincoln at col. 5, lines 20-45.) Nothing in this description suggests placing a management event record corresponding to the forward resource management control cell in a queue, as claimed.

Moreover, Lincoln fails to teach or suggest processing a management event record, which was placed in a queue after receipt of the corresponding FRM cell, after the FRM cell has been forwarded by the network switch. Although Lincoln discloses determining rate-based, flow control data in response to receipt of an FRM cell at a source station, and Lincoln discloses forwarding of FRM cells in a network switch, Lincoln fails to describe the claimed timing of the processing and the

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forwarding together in combination in a network switch in relation to a received BRM cell to be modified. Additionally, with respect to dependent claim 41, the official action fails to address where Lincoln teaches or suggests the limitation, "said forwarding the forward resource management control cell occurs before said removing the management event record from the queue."

Independent claim 45 recites, "management event circuitry operatively coupled to the source port circuitry to receive control cells from the source virtual channel and to compute rate-based, flow-control data in response to receipt of a forward resource management control cell that corresponds to a connection linking a source node and a destination node via the data transmission apparatus; and return cell circuitry operatively coupled to the source and destination port circuitry and to the management event circuitry, the return cell circuitry comprising circuitry to receive control cells from the destination port circuitry, to modify a backward resource management control cell based on the rate-based, flow-control data computed by the management event circuitry, and to provide the modified backward resource management control cell to the source port circuitry for transmission over source virtual channels." Claim 45 defines the network switch that implements the invention, where a received BRM cell is modified based on the rate-based, flow-control data computed in response to receipt of the corresponding FRM cell (e.g., directly inserting explicit rate (ER) parameter data calculated before the BRM cell is even received).

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In the present invention, a table indexed by a connection identifier with one entry per active ABR connection can be used to hold the last calculated ER estimates in the switch. The table can be maintained by a processor system that performs the traffic management algorithms based on per port and per connection statistics for the switch. In contrast with the cited references, table updates that are used in modifying received BRM cells in the switch are driven by events generated by the corresponding FRM cells passing the port.

FRM events can be queued until the switch's processor is ready to process the events. The processor can calculate an updated ER for the corresponding connection and can store the result in the table where it can then be used for BRM modification until the next event for that connection occurs and a recalculation is performed. Thus, the BRM cells can be modified using only the table, and the rate-based, flow-control data need not be recalculated in response to receipt of the BRM cell. Lincoln fails to teach or suggest this timing of processing in the network switch as claimed to promote above-described advantages.


In view of the above remarks, therefore, it is respectfully suggested that all pending claims, 37-54, are in full condition for allowance, and an official notice of allowance is requested.

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No fee is believed to be due Please apply any necessary
charges or credits to Deposit Account No. 06-1050.

Respectfully submitted,

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